SWING BOOM PIVOT MECHANISM

FIELD

The present invention relates to an improved attachment arrangement for mounting a pivot base to the boom of a Swing Boom Assembly used on a skidder.

BACKGROUND OF THE INVENTION

Skidders are used in the forest industry to retrieve and load felled trees. Most consist of a prime mover, and a grapple attached to the end of a boom. Booms are typically mounted to the prime mover through a base allowing movement in a vertical plane. Side to side movement is accomplished through movement of the prime mover. Added maneuverability can be obtained by adding a pivoting base to which the boom is attached allowing the boom to swing about a vertical axis relative to the prime mover. This type of boom is commonly referred to as a Swing Boom Assembly.

The method of mounting the pivot to the base and boom becomes critical to prevent overloading of components. The boom assembly includes the boom, boom cylinder and grapple.

Referring to Figures **1-4**, a conventional method of attaching the main body **30** of a pivot base **22** to the boom assembly **32** of a swing boom **11** is shown. A horizontal pin **24** and boom cylinder **26** connect the boom **28** to the pivot

base **22**. The extension of the boom cylinder **26** controls the amount of vertical motion of the boom **28**.

The pivot base **22** further comprises an upper spherical bearing **34**, lower spherical bearing **36**, and a swivel actuator **38**. The upper spherical bearing **34**, and lower spherical bearing **36** permit the main body **30** of the pivot base **22** to rotate about a vertical axis relative to the fixed base **40**. The swivel actuator **38** controls the amount of horizontal rotation of the pivot base **22** and boom **28** about the vertical axis.

As shown in Figure **1**, conventional designs incorporate an upper pivot shaft **42**, and lower pivot shaft **44** rigidly attached to the main body **30** of the pivot base **22**. The upper pivot shaft **42** passes through the upper spherical bearing **34**, and the lower pivot shaft **44** passes through the lower spherical bearing **36**. The outer races of the upper and lower spherical bearings **34** and **36** are rigidly attached to the fixed base **40**.

As best shown in Figures **2-4**, the upper pivot shaft **42** extends past the upper spherical bearing **34**. A clevis joint **46** is used to connect the boom cylinder **26** to the upper pivot shaft **42**. The line of action of the boom cylinder **26** passes through the upper pivot shaft **42** above the upper

spherical bearing **34** creating an overhung loading condition. Depending on the particular loading and position of the boom assembly **32** in the vertical plane, stresses due to the bending moment can become excessive, especially at the connection between the upper pivot shaft **42** and the main body **30** (see Figure **4**). As a result, the conventional method of attachment can lead to cracking and failure of the components comprising the vertical axis of the pivot base under severe operating conditions. As such, there is a need for an improved attachment method for mounting the pivot base to the boom assembly.

SUMMARY

The present invention relates to a swing boom assembly, which has a fixed base, a pivot base rotatably mounted on the fixed base, and a boom pivotally coupled to the pivot base. The boom is coupled proximate a lower end of the pivot base and has a hydraulic piston cylinder coupled between the boom and an upper end of the pivot base. The hydraulic piston cylinder is operative to raise and lower the boom. The pivot base has an upper shaft, a main body having a pair of spaced apart clevis plates affixed to each end of the upper shaft, and a spherical bearing rigidly mounted around the upper shaft between the clevis plates and said bearing having an outer race rigidly mounted to the fixed base.

The hydraulic cylinder assembly may be pivotally coupled to the pivot base at a level intermediate to the clevis plates.

The clevis plates are preferably integral with the main body.

BRIEF DESCRIPTION OF THE DRAWINGS

Further features and advantages of the invention will be apparent from the following detailed description, given by way of a preferred embodiment taken in conjunction with the accompanying drawings, wherein:

Figure 1 is a vertical sectional view through the middle of the prior art conventional pivot base connection;

Figure 2 is a perspective view of the prior art conventional pivot base connection;

Figure 3 is a side view of the prior art main body of the pivot base and conventional upper joint;

Figure 4 is a sectional view along line 1-1 of Figure 2;

Figure 5A is a perspective view of an improved Swing Boom Assembly in a neutral pivot position;

Figure 5B is a perspective view of an improved Swing Boom Assembly in a neutral pivot position;

Figure 6 is a vertical sectional view through the middle of the improved pivot base connection;

Figure 7 is a perspective view of the improved pivot base connection

Figure 8 is a side view of the main body of the pivot base and improved upper line; and

Figure 9 is a sectional view along line 2–2 of Figure 8

DETAILED DESCRIPTION

Referring to Figures **5A** and **5B** the movement of the main parts of a swing boom **10** are shown. A fixed base **52** is mounted rigidly to the prime mover (not shown). The boom assembly **60** is attached to the pivot base **46**. The boom assembly **60** includes the boom **14**, boom cylinder **58**, and grapple (not shown). The grapple attaches to the boom **14** at the grapple attachment point **16**. The pivot base **46** rotates from side to side as shown by double sided arrow **20** in Figure **5A**. The pivot base **46** is shown rotated counterclockwise in Figure **5B**. The extension of the boom cylinder **58** controls the amount of vertical motion of the boom **14**. The boom **14** may move in a horizontal plane with the movement of the pivot base **46** as shown by arrows **20**, as well as a vertical plane as illustrated by arrows **21** in Figure **5B**.

Referring to Figures **6-9**, an improved design for the attachment of the main body **54** of a pivot base **46** to the boom assembly **60** is mounted to the main body **54** of the pivot

base **46**. The pivot base **46** is modified from the conventional method described in connection with Figures **2-5** at the upper pivot shaft **48**. Similar to the conventional method, the outer race of the upper spherical bearing **50** is rigidly mounted to the fixed base **52**. However, the main body **54** of the pivot base **46** is extended forming an integral clevis around the upper spherical bearing **50**, and both ends of the upper pivot shaft **48** are rigidly mounted to the main body **54** (see Figure **9**). Advantageously, the new geometry substantially reduces the bending moment on the upper pivot shaft **48** relative to the main body **54**, and resultant stresses in the upper pivot shaft **48**.

Accordingly, while this invention has been described with reference to illustrative embodiments, this description is not intended to be construed in a limiting sense. Various modifications of the illustrative embodiments, as well as other embodiments of the invention, will be apparent to persons skilled in the art upon reference to the description. It is therefore contemplated that the appended claims will cover any such modifications or embodiments as fall within the true scope of the invention.